2009

Book Review: *The Mermaid's Tale: Four Billion Years of Cooperation in the Making of Living Things* by Kenneth M. Weiss and Anne V. Buchanan, Harvard University Press, 2009

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Published in *Trends in Ecology and Evolution* (2009) 24(11): 589-590. Copyright 2009, Elsevier. Used by permission. DOI:10.1016/j.tree.2009.07.00S.

Book Review
The Evolution of Ideas Whose Time Has Come

The Mermaid's Tale: Four Billion Years of Cooperation in the Making of Living Things by Kenneth M. Weiss and Anne V. Buchanan, Harvard University Press, 2009. US$35.00, hbk (336 pages) ISBN: 9780674031937

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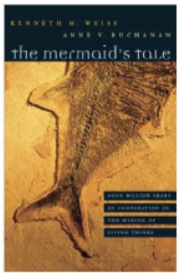

The Mermaid's Tale, an engagingly written collection of thoughts across a range of topics, should be read by all evolutionary biologists. Some might regard this volume lightly, comfortable explaining biocomplexity with random variation and selection. Others will find new ideas and connections among them, comforted by the authors' reassurance that nothing that they propose invalidates natural selection. Yet others will experience a strong sense of déjà vu, recognizing topics that they proposed and that caused great commotion, the last time we celebrated a Darwin anniversary. However, it is unlikely that they will find their work cited (none of mine is).

The time was not right for those ideas 25 years ago. If the time is now right, then it might be important to avoid the historical baggage that provoked professional antagonisms a generation ago. One way to remove that stumbling block is terminological rebranding. Darwin spoke of organisms being 'indifferent' to their surroundings with respect to their reproduction. In keeping with changing social mores, 'indifferent' became 'selfish.' More recently, the popularity of self-organization morphed 'selfish' into 'autonomous'. These are different words, but all underscore Darwin's hypothesis that organisms exhibit pronounced insensitivity to the environment with respect to reproduction, in contradistinction to lamarckian views emphasizing a direct relationship between reproduction and adaptive responses to environments. For darwinians, this 'misfit' between reproductive products and the environment is a mechanism, natural selection, producing indirect adaptive responses. Whereas Lamarck believed that species simply adapted to the changing conditions, Darwin believed that environmental change could outstrip the adaptive capabilities of species, leading to extinctions, perhaps even mass extinctions. In this case, terminological rebranding maintains conceptual continuity.

Efforts to make new ideas more palatable can, however, reintroduce conceptual difficulties that previous terminology was designed to eliminate. Maynard Smith and Szathmáry [1] proposed that evolutionary transitions resolved confiicts of interest in favor of division of labor, because division of labor led to more efficient means of storing and transmitting biological information. The authors of this volume have a similar view, but they suggest that different elements of life cooperated to avoid confiicts of interest. Trying to rebrand, they inadvertently re-introduce teleology into evolutionary theory. In this case, they would have been well advised to read treatments of the topic from the 1980s [2]. Niles Eldredge has eloquently shown (e.g. reference [3]) how inferences of intentionality blur the distinction between lamarckian and darwinian explanations.

When Ed Wiley and I addressed the centrality of historical correlations and irreversibility in evolutionary diversification [4], we struck a sour note with an optimistic scientific consensus that believed in a sort of 'Archimedes lever' view of evolution (give me enough variation and the right environment, and I will change elephants into mice). A decade later, Maynard Smith and Szathmáry wrote about evolutionary transitions, all of which are irreversible events in the history of life, resulting from the conjunction of improbable events, making irreversibility seem epiphenomenaI. Their rebranding successfully introduced temporal irreversibility into the vocabulary and research programs of many who reacted so viscerally to the original Brooks and Wiley proposal.

The authors of this volume avoid this entire issue by suggesting that biologists have been paying too much attention to evolution, an interesting perspective. The authors view

natural selection and descent with modification as emergent properties of more fundamental phenomena, the organizational building blocks and first principles of molecular biology. Here, they align themselves with a long-standing tradition, stretching back to *Entwicklungsmechanik* during the late 19th century and connecting in recent times with those biologists who eschew historical explanations by saying they do not need to know how something originated to understand and explain everything of scientific relevance. Thomas Hunt Morgan once wrote, '[With the advent of experimental studies of genetics] ...biology is no longer a branch of history. It is now a science' [5]. Perhaps the authors of this book, similar to Morgan, see no need to debate this issue, believing that 'historical science' is an oxymoron. But for authors who subtitled their book 'Four billions years of cooperation in the making ofliving things,' such an exclusionary perspective could seem a little jarring. 'Four billion years' implies that the passage of time is important, and 'the making of living things' indicates an engineering or constructionist (non-historical) perspective on how all this came about. I do not know the authors, but if they are the same age that I was during the 1980s, I am happy to give them leeway for youthful exuberance, and see what changes in the next edition or next book.

There was a distinctly counterculture flavor to proposals made during the 1980s. By contrast, the authors of *The Mermaid's Tale* are appealing to the establishment. If successful, they will deserve to have their words used. If they meet the aggression and vitriol that greeted those voicing similar ideas during the 1980s, they might find solace and support in some of that older literature. However, they will then risk having to share the spotlight: division of credit in science parallels divisions of labor in general evolutionary phenomena. If they do not want to cooperate, they might gain all the credit for themselves but they risk having their good ideas marginalized and then later co-opted without any attribution. Having endured that myself, I would not wish it on anyone else.

In the second paragraph of the 6th edition of *Origin of Species*, Darwin [6] articulated his theory thusly '... there are two factors: namely, the nature ofthe organism and the nature of the conditions. The former seems to be much more the important; for nearly similar variations sometimes arise under, as far as we can judge, dissimilar conditions; and, on the other hand, dissimilar variations arise under conditions which appear to be nearly uniform.'

Some researchers are more interested in the nature of the conditions, whereas others are more interested in the nature of the organism. This has led to fragmentation of Darwin's panoramic view, loss of communication among specialists and multiple confiicts of interest. If, for sorne reason, we wish to unify biology and resolve confiicts of interest, I suggest that we use Darwin's framework as a template for the division of labor. But doing so will mean that biologists will have to communicate with, and respect, each other across disciplinary boundaries: cooperation, not subordination.

References

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